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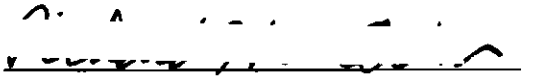

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PLANNING FOR TRUCK TERMINAL DISTRICTS

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PLANNING FOR TRUCK TERMINAL DISTRICTS

A THESIS

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SUMMARY

The purpose of this study is to provide a guide for planners and members of the trucking industry in planning for truck terminals in urban areas. The study presents an analysis of the present structure of the trucking industry and the types of truck terminals that have been developed. As a result of the investigation, the establishment of truck terminal districts is recommended. The surveys and studies needed in planning for truck terminal districts are presented, along with methods for implementing these plans.

This study deals with the common carrier segment of the trucking industry, which is the major user of the truck terminal. Individual truck terminals are preferred by truckers since such terminals minimize the danger of shutdowns caused by labor strikes and enable the truckers to have direct contact with their customers. However, the increasing amount of freight interchanged between motor carriers makes it important to locate these terminals in close proximity.

The truck terminal district provides the most appropriate means of coordinating the needs of the trucking industry into the development plans for the community. A properly located terminal district will be of value to the trucking industry by making available terminal sites that are convenient to other truck terminals, related land uses and major customers. The terminal district will benefit the community by alleviating traffic congestion caused by trucks and by providing adequate protection of unrelated land uses from the nuisance factors of the trucking

operation.

Access to expressways and major interstate highways is the most important locational factor. However, access to railroad, port and air freight facilities is becoming increasingly important due to an increasing amount of freight being interchanged between trucks and these transportation modes. Proximity to the major customers of the trucking industry is also an important locational factor in evaluating sites for truck terminal districts.

The designation of terminal districts on the future land use plan is one method of encouraging the proper location of truck terminals. Planned terminal districts, developed in the same manner as planned industrial districts, may be included within these designated districts on the future land use plan. The zoning ordinance can be an effective tool for controlling the trucker's operation by permitting truck terminals and related facilities in a manufacturing or industrial district with special requirements pertinent to truck terminals.

CHAPTER I

INTRODUCTION

Truck terminals have become a problem in many urban areas for both the city and the trucking industry. Many terminals are in obsolete downtown buildings. Often they are located on sites that are too small for the efficient operation of today's modern freight handling facilities. Improperly located truck terminals have caused increasing traffic problems owing to the growing number and increasing size of large intercity trucks.

Industrial decentralization and the interstate system of highways have made it practical to consider new locations for truck terminals. Modern terminals are now being built in the outlying areas where ample space can be obtained. The relationship between truck terminals, themselves, and also between terminals for trucks and for other modes of freight transportation is becoming increasingly important.

There has been a lack of coordination between city planners and the trucking industry. The trucking industry's growth has been largely the result of individual initiative with little concern for other aspects of city development. Likewise, local governments have given little consideration to the needs of the trucking industry in planning for the city's development.

The purpose of this study is to propose a solution to the truck terminal problem that will be acceptable to the trucking industry and

will also be in accordance with the city's development plan. The truck terminal district, composed of individual truck terminals and related land uses, will provide in many urban areas an appropriate solution for the trucking industry and the community. The district should be properly located in accordance with the plans and regulations of the community. It should provide for economical and efficient transfer of freight for the industry and should result in minimum truck traffic on city streets.

This solution was determined by studying the trucking industry and the various types of truck terminals, by analyzing factors involved in motor freight shipment and by giving proper consideration to the aspects of the community affected by the location and operation of truck terminals. Information for this study was obtained from a review of pertinent literature and of local ordinances and regulations and by correspondence and personal interviews with persons or agencies involved in or having knowledge of truck terminal location and operation in urban areas.

CHAPTER II

THE TRUCKING OPERATION

Freight hauled by trucks has increased since World War II more rapidly than freight hauled by any other major mode of freight transportation. With the growth of the trucking industry have come changes in the location and operation of truck terminals. This chapter will give a brief history of the trucking industry and truck terminals and will present the advantages of truck terminal districts.

The Trucking Industry

One method of measuring the trucking industry's growth is to compare its ton-mile volume of freight hauled with that of other intercity freight carriers. The total volume of intercity freight hauled by all types of carriers grew from 1,027 billion in 1945 to 1,395 billion in 1962 or 36 per cent.[1]

During this period, intercity freight hauled by trucks increased 395 per cent or from 6 per cent to 24 per cent of the total volume. Freight hauled by railroads (the leading freight hauler) decreased 13 per cent from 61 per cent of the total volume to 43 per cent. Freight hauled by inland waterways increased 54 per cent from 14 per cent of the total volume to 16 per cent. Ton-miles of oil transported by pipelines increased 92 per cent or from 12 per cent of the total volume of intercity freight to 17 per cent. While the percentage increase in freight hauled by airways is slightly over 1000 per cent, it is not considered

among the major modes of freight carriers. It hauls less than 1/10 of 1 per cent of the total volume with an increase in the total volume of from only .009 per cent in 1945 to .075 in 1962.[2]

Reasons for Growth

Flexibility and speed of service for short hauls are two major advantages of the trucking industry over other modes of freight transportation. The truck's small unit size makes it flexible and enables the trucker to adjust his schedule to fit the customers' needs if necessary. In addition, trucks can provide service any place along the more than 3,000,000-mile system of highways. The average truck haul is less than 500 miles and it is within this distance that speed of service is a major advantage. Air and possibly rail may be faster for distances over 500 miles. However, since freight hauled by air and rail is nearly always picked up and delivered by trucks, this transfer time decreases any speed advantage of air and rail service for short distances.

In addition to these advantages over other modes of freight transportation, economical and dependable truck transportation is developing new freight traffic. Freight movement by truck is a big factor in the trend toward industrial decentralization to the suburbs, small towns and rural areas. Many industries are locating in communities that are entirely dependent on trucks for freight movement. As a result, this decentralization has contributed significantly to the growth of the trucking industry.

Structure of the Trucking Industry

The trucking industry has four types of motor freight carriers--private, exempt, contract and common. There are more than 11.5 million

private trucks compared to slightly over 1 million for-hire carriers which include exempt, contract and common carriers. However, for-hire trucks accounted for more than 1/3 of the total 332 billion ton-miles of freight hauled by trucks in 1962.

Private Carriers. Private carriers are used by business enterprises whose main activity is not transportation. For example, private trucks are used in transporting bakery and other food products, petroleum, textiles and furniture. Trucks used to transport groceries for a large chain of supermarkets such as Kroger or Safeway are a specific example. Private carriers operate a larger number of vehicles than for-hire carriers but the trucks, on the average, have smaller capacity and are normally operated over shorter trip lengths.

Exempt Carriers. Exempt carriers transport certain commodities for hire, but they are exempt from regulations by the Interstate Commerce Commission. The reason for exemption is based either on type of product hauled or area of operation. Initially these carriers were exempted to permit producers of primary food products, such as farmers and fishermen, to transport their goods to market without regulation. However, today the category has been broadened to include all forms of unprocessed agricultural commodities. In addition, intrastate trucks and local pick-up and delivery trucks are in this category, even though they may handle intercity freight delivered to them by a common carrier.

Contract Carriers. Contract carriers provide service to meet the individual needs of a limited number of customers. They handle products requiring special equipment for hauling such as chemicals, automobiles and liquid products. Contract carriers normally haul truckload shipments

directly from the shipper to the receiver.

Common Carriers. Common carriers are available to anyone for transporting any size freight shipment. They normally handle freight consisting primarily of relatively small packages. Common carriers offer standardized service at uniform rates over authorized service routes. The freight is picked up from many individual shippers and consolidated at the truck terminal for shipment by large over-the-road trucks to its city of destination. At the truck terminal in the city of destination, the freight is then transferred into smaller trucks for local delivery.

The common carrier is the major user of truck terminals. Private, exempt and contract carriers usually use the facilities of their customers or major businesses for freight handling and truck storage. The truck terminal is the primary base of operation for the common carrier.

Terminals

The truck terminal is the meeting point of two distinct operations--local pickup and delivery and line-haul interchange. It is the point where less-than-truckload (LTL) freight arriving in large over-the-road carriers is sorted and reloaded for delivery in the local area, and where local freight is assembled and loaded into over-the-road carriers for intercity transport. The truck terminal is also the place where freight is transferred from one intercity carrier to another for shipment to a destination outside the local area.

There are three different types of truck terminals--union, joint and individual. Their differences are based primarily on the terminal ownership and operation and on the pickup and delivery service.

Union Terminals

In a union terminal, platform freight handling, bookkeeping and local pickup and delivery are usually the responsibility of the terminal operator. The common carrier is responsible only for delivering or receiving over-the-road freight at the terminal. The terminal may be publicly or privately owned and operated, or it may be cooperatively owned and operated by a group of intercity carriers.

The New York Union Motor Truck Terminal was opened in New York in December 1949 and was operated for more than two years by the Port of New York Authority. During this initial two-year period, it became evident that this agency-type operation was not satisfactory. Union terminal operation was designed to lower freight costs by consolidating deliveries and pickups. However, this advantage was not strong enough to offset the trucking companies' inherent desire to retain their individual identity through personal contact with their customers. As a result, the Port Authority suspended operation in March 1952.

Later in 1952, the terminal was leased to the Empire State Truck Terminal Company, Inc. This company is made up of seven major over-the-road carriers who jointly operate the facility under common management. The Executive Vice President of Empire State Truck Terminal Company, Inc. recently stated: "After twelve years of operation, some gains have been made. . . . Taking a long range point of view, I believe that our accomplishments will prove that this type of operation can work successfully. . . ."[3]

A second union terminal, the Newark Union Motor Truck Terminal in New Jersey, was constructed by the Port Authority in 1950. However, dif-

ficulties arose between the Port Authority and the trucking unions during construction. By the time the terminal was completed, union contract restrictions made the operation of the terminal uneconomical. Consequently, the Newark terminal was leased to the Air Force from the time of its completion until 1955. In 1955 the Newark Union Motor Truck Terminal was leased to the Garden State Truck Terminal Corporation, composed of ten over-the-road carriers. Unfortunately, labor problems again hampered the terminal operation and the corporation ceased operations in 1960. At present, the Newark truck terminal is occupied by several over-the-road carriers who lease operating space as individual tenants.

The design, utility and economic feasibility of these two union terminals were far superior to individual terminal operation. They provided modern freight handling facilities to a number of small carriers who could not otherwise afford them. In addition, the consolidated pickups and deliveries provided an economic advantage as the local trucks handled capacity loads to and from specific zones. However, the truckers' contact with their customers and the cooperation between the terminal operators, unions and trucking companies were initially unsatisfactory.

The New York Union Motor Truck Terminal operation has demonstrated that it is possible for carriers to operate a common platform and joint pickup and delivery service. Mr. Walter P. Hedden, transportation consultant and past Director of Port Development of the New York Port Authority, made the following statement concerning union terminals: "The cohesive strength of the joint venture appears to lie in the joint pickup and delivery service, which the participating carriers establish

through their own instrumentality in place of individual contracts with local zone carriers."[4]

Joint Terminals

In joint terminals, over-the-road carriers lease space only. They provide their own freight handlers and have control over local pickup and delivery. The carriers may use their own local delivery trucks or may contract with a local cartage company for pickup and delivery. The major difference between union and joint terminals is that in joint terminals, local service is controlled by the individual line-haul carrier.

Most terminals that have more than one over-the-road carrier operating under one roof are operated as joint terminals. The Newark terminal and a portion of the New York terminal are presently being operated as joint terminals. A survey of 33 terminals with more than one trucking company under one roof disclosed that only two were not jointly operated by the trucking companies using the terminal.[5]

Individual Terminals

An individual terminal is operated by one trucking company. Due to the increasing number of large trucking companies, the individual terminal is the most popular type of terminal being constructed today. These modern terminals provide equipment for the efficient transfer of goods, have adequate space for truck maneuvering and storage plus sufficient space for offices and truck maintenance and repair. The company operating an individual terminal usually conducts both the local pickup and delivery of freight and the intercity transport of freight. This enables the company to keep in personal contact with every customer and

also have responsibility for the efficiency of the entire operation.

There are factors in the location of individual truck terminals which are important to both the trucking industry and the city. Proximity to other truck terminals and to related land uses is important because this proximity makes operations economically attractive to the trucking industry and reduces unnecessary truck traffic on city streets.

Terminal Districts

The truck terminal district is a tract of land within which are permitted truck terminals and related land uses. Terminal districts may be of two basic types--planned districts and designated districts. Planned terminal districts are tracts of land in single ownership that are developed with improvements installed prior to operation. Designated terminal districts are tracts of land included in the future land use plan in which truck terminals, related land uses and also the major customers of the trucking industry may be permitted. The following discussion applies to both planned and designated terminal districts.

Composition of Terminal Districts

The major land use within the terminal district is likely to be the truck terminal. In addition, the district should provide space for related commercial, warehouse and administrative facilities.

Truck Terminals. The individual truck terminal is the major component of the truck terminal district. The district should provide individual terminal space for the large trucking companies. It may also include union or joint terminals to accommodate the smaller trucking companies that are not financially able to provide their own modern indi-

vidual terminal facilities.

Related Commercial Facilities. The terminal district should include two types of commercial facilities: (1) those serving primarily the trucking industry; and (2) those serving both the trucking industry and other customers. Commercial facilities serving only the trucking industry include: (1) new and used tractor and trailer truck sales; (2) truck service and repair shops; and (3) sales and service facilities for the equipment used in the terminal operation. Those serving the general public as well as the trucking industry include hotels or motels, restaurants, retail stores, personal services and offices.

Warehousing Facilities. Warehousing facilities are needed in the terminal district. Since truck terminals seldom provide space for storage of freight for more than 24 hours, warehouses are required for storing freight for longer periods of time. The warehouse operation may include pickup and delivery trucks that would be responsible for assembling freight from the trucking companies and possibly distributing freight throughout the community.

Administrative Facilities. Administrative facilities should also be included in the terminal district. These facilities may include space for union headquarters, trade association offices, meeting places and recreation facilities for employers and employees. If the district is a planned terminal district these facilities may be located in an administration center which would also include offices for the administration of the terminal district.

Buffers. Since the truck terminal is a 24-hour operation, it is especially important that there be a buffer to protect the surrounding

properties from the noise and lights. In a planned terminal district, a buffer strip around the district should be included in the development plan. In a designated district, provision for a buffer strip at the boundaries should be included in the zoning ordinance.

Advantages of Terminal Districts

In addition to the convenience of related land uses and protection from unrelated land uses, the truck terminal district has definite advantages to both the community and the trucking industry. Easy interchange of freight and the reduction of movement of over-the-road carriers on city streets are two major advantages of the truck terminal district.

The convenient interchange of intercity freight between motor carriers is one of the major advantages of a truck terminal district. By locating terminals in close proximity there will be a definite economic advantage for the trucking industry. This will result from less time spent in transporting freight between scattered terminals. The following observation is the result of a study conducted in Chicago in 1950.

> The interchange of freight is probably one of the greatest problems confronting our transportation system. . . . 16.5% of the total number of shipments and 27% of the volume in weight of all freight handled by motor carriers is traffic interchanged between the motor carriers themselves--freight which neither originates in nor is destined to the City of Chicago, but rather moves from a point outside of the city to another point beyond the city. . . .[8]

Traffic congestion caused by trucks transporting intercity freight between terminals can be eliminated if the terminals are located in a terminal district. By locating the terminals in the district with convenient access to each other on streets designed primarily for truck

traffic, the time involved in transporting intercity freight between terminals will be considerably reduced.

CHAPTER III

PLANNING FOR TRUCK TERMINAL DISTRICTS

In planning for truck terminal districts the planner should study the needs of the trucking industry to determine the demand, the total amount of space needed and the location for terminal districts. In evaluating sites for truck terminal districts, immediate access to expressways and major highways is the most important locational consideration. Other factors which should also be considered are access to railroad, port and air freight facilities and to the major customers of the trucking industry. In addition, there are physical site requirements to be considered.

Demand for Terminal Districts

In order to determine the demand for truck terminal districts, a survey of truck terminals and related commercial, warehouse and administrative facilities should be conducted. The survey of existing terminals should include:

1. Number of truck terminals in the area, and more specifically, the number of platform doors.
2. Location, condition and amount of space used for truck terminals.
3. Amount of freight distributed by intercity carriers in the area.
4. Amount of freight transferred to warehouse facilities.

5. Amount of freight interchanged among motor carriers.
6. Amount of freight interchanged between trucks and other modes of freight transport.
7. Adequacy of existing terminal operations including:
   (a) accessibility
   (b) dock space for freight transfer
   (c) maneuvering space for trucks
   (d) office space
   (e) parking
8. Desire of trucking companies to relocate terminals.

The survey of related facilities should include:

1. Types of facilities related to trucking industry.
2. Amount of space used for these facilities.
3. Location and condition of structures.
4. Dependency of these facilities on the trucking industry.
5. Willingness to relocate.

In addition to these surveys, the planner should make the following studies:

1. Determine the existing terminals and related facilities that are to be displaced by major improvements such as urban renewal, highway relocation or downtown improvements.
2. Determine future demand for truck terminals based on existing freight volumes and future anticipated trends of the trucking industry.

These surveys and studies will give the planner sufficient knowledge of the trucking industry in a particular urban area to determine the

future demand for truck terminal districts. Knowledge of the adequacy of existing terminals, desire of companies to relocate and the number of terminals in areas scheduled for major improvements will assist the planner in determining the demand for space in the terminal districts.

Components of Terminal Districts

The components of a truck terminal district are truck terminals and related facilities.

Truck Terminals

A truck terminal usually includes: (1) docks for handling freight transfer and temporary storage; (2) office space for billing and bookkeeping; (3) maintenance shop for truck and trailer repairs; (4) apron space for truck maneuvering; and (5) parking space for employees and trucks.[7]

Terminal size is based on the amount of freight to be handled by the trucking company. The most practical unit of measure is the number of platform doors at the loading docks compared with the amount of freight handled by the motor carrier. Seven to ten tons of freight per door per day may be used as an average for determining the number of doors needed.[8] The amount of freight per door will be reduced by: (1) number of interline carriers with which the trucker interchanges freight; and (2) number of cities to which the trucker provides delivery service. Using this unit of measure, the following table may be used in determining the terminal size.

As the size of trucks and trailers increases, maneuvering and parking space also increases. The amount of maneuvering space necessary

depends on the following conditions: (1) length of tractor trailer units; (2) width of loading position; and (3) turning radius of tractor.[9] "Double-bottom" trucks, those having two trailers, will require additional parking for the extra trailer.

Table 1. Desirable Standards for Determining Truck Terminal Size

Components	Area per Door
Dock Area	480 sq. ft.
Office Space	200
Maintenance Shop	60
Maneuvering Space at Dock	1,200
Truck Parking	1,200
Employee Parking	200
Landscaping, Buffers, etc.	160
Total Area per Door	3,500 sq. ft.

Truck terminal buildings are usually built with offices across the front and a rectangular loading dock extending back from the offices. Recently, terminals have also been built with offices in the middle of a rectangular building and loading docks extending on either side. A rectangular lot is the most practical shape for a terminal site.

Related Facilities

The related facilities of the terminal district include commercial, warehouse and administrative uses. The planner should base the space needs for commercial facilities on the need for these facilities by the trucking industry. The amount of space needed for warehouse facilities is determined by the amount of freight brought into the terminals needing storage for longer than 24 hours. The amount of space needed for administrative facilities should be based on needs of truckers' unions, trade associations and related organizations and the approximate number of employees in the district.

Locational Factors

Locational factors to be considered in planning for truck terminal districts include: (1) access to expressways and major interstate highways; (2) access to railroad, port and air freight facilities; and (3) proximity to the major customers of the trucking industry.

Expressways and Major Highways

Expressways and major interstate highways are the most important locational factor in planning for truck terminal districts. Interstate and other limited access highways now make it possible for larger trucks to transport greater payloads between cities. However, because of the length, long turning radius and gross weight of these larger trucks, it is becoming increasingly difficult for them to maneuver on local city streets. Therefore, it is necessary for truck terminals to be located with the most direct access possible to these major highways.

The trucking industry is continually striving to get load limits

and truck lengths increased to permit more freight to be carried by each driver. This effort is being realized in the state of New York where double-bottom trucks (96 feet in length) are now permitted on the New York Thruway. Ten trucking companies with access to the thruway are taking advantage of the 127,000 pound payload that can be carried by these double-bottom trucks.[10]

Truck manufacturers are developing new trucks designed primarily for interstate and other express highways. Ford introduced its experimental gas turbine superhighway truck in October, 1964.[11] This 96-foot double-bottom truck is capable of carrying 150,000 pounds of cargo at a speed of 70 miles per hour. General Motors Research Laboratories announced their new 280-horsepower regenerative gas turbine truck known as the "Bison" in April, 1964.[12] The Director of Dodge Truck Operations made the following comments regarding the future of highways and trucks in a speech in October, 1964:

> As the truck length increases in the future, we shall most certainly see more truck trains on the highway. . . . We may also see multiple tractors pulling a long truck train. . . . The day may come when there is an almost unlimited interchange of trailer equipment. . . .[13]

Access between the terminal district and the interstate or other expressways should be planned for a minimum of traffic disruption. Acceleration and deceleration lanes should be provided to enable the large intercity trucks to maneuver into and out of the main traffic flow. The planner should consider the possibility of obtaining direct access from the expressway to the terminal district.

Other Freight Transportation Facilities

The increasing amount of freight being interchanged between trucks

and other modes of freight transportation makes access to railroad, port and air freight facilities an increasingly important locational factor in evaluating sites for truck terminal districts. Priority for these facilities should be based on the amount of freight transferred between trucks and these facilities.

Railroad Facilities. There has been rapid expansion in the trailer-on-flat-car (TOFC) or "piggy-back" operation. In 1955, 32 railroads offered "piggy-back" service and reported a total of 168,150 flat cars loaded with highway trailers. By 1963, 63 railroads were offering the service and reported a total of 797,474 cars loaded with highway trailers--an increase of 374 per cent.[14] Reliable estimates report that one-fourth of this "piggy-back" traffic is being coordinated with common carriers.[15]

This use of railroads by the common carriers makes the location of the terminal district in relation to rail facilities increasingly important. If possible, railroad sidings should be in or border the district. Where rail facilities are available, it is important that sufficient space be provided for loading the trailers on the flat cars.

Port Facilities. If there are port facilities in the community, they should be considered by the planner in evaluating sites for truck terminal districts. Containerization of freight has made it economically feasible for common carriers to coordinate freight shipment with intercoastal and transoceanic shipping services. This relatively new concept, known as "fishy-back," will probably become increasingly important to the trucking industry's freight movement.[16]

Air Freight Facilities. Coordinated air-truck freight is rela-

tively new with only a small volume of freight now interchanged between these two transportation modes. In an interview, the owner of a major trucking company in Atlanta revealed that several of his intercity trucks make daily stops at the Atlanta airport to deliver freight before coming to the truck terminal.[17] The owner stated if this freight must be transported from the truck terminal for long distances over city streets, the value of interchange between air-truck freight will be lost.

The coordination of freight interchange between trucks and these three modes of freight transportation has only recently been given serious consideration. The trucking industry's growth has been primarily the result of its individual initiative. However, it is becoming evident that in order to provide the shipper with the most economic and efficient freight service, there must be greater coordination. For this reason, the planner should consider the existing and future location of railroad, port and airport facilities in evaluating sites for truck terminal districts.

Customers of the Trucking Industry

In evaluating sites for truck terminal districts, proximity to the major customers of the trucking industry should be considered. The planner should study both the geographical distance and the time spent enroute between the customers and the terminal district. The future land use plan and the major thoroughfare plan will be of value in determining the most appropriate sites.

The major customers of the trucking industry are manufacturing industries. However, wholesale warehouses and retail establishments also use trucks for most of their freight shipment. The following table

indicates the major customers of the trucking industry and the percentage of their freight shipped by truck.

Table 2. Use of Trucks for Freight Shipment by Industry--ATA Survey, 1963[18]

Manufacturing or Other Land Use	Per Cent Shipped by Truck	
	Outbound	Inbound
Leather	96	96
Scientific Instruments	93	91
Wholesale Trade	91	64
Warehousing	90	71
Textiles	90	93
Fabricated Metal Products	88	76
Miscellaneous Manufacturing	88	87
Apparel	85	89
Food	84	65
Furniture	76	72
Machinery	73	87
Electrical Equipment	70	73

Site Requirements for Planned Terminal Districts

The physical site requirements which should be considered in locating truck terminal districts include size of district, topography

and soils, utilities and buffer strips.

Size of Terminal District

In order to assure adequate space for truck terminals and related land uses, the community should determine a minimum size for terminal districts. In a report prepared in 1952 by the Committee on Motor Truck Terminals for the City of Chicago, a minimum size of 25 acres was recommended for truck terminal districts.[19] However, due to the increasing size of individual terminals, a minimum size of 100 acres would probably be more realistic today.

A review of recent studies for truck terminal districts revealed the increasing size of districts that are presently being developed. Two truck terminal districts are now being developed in the Chicago area. The South Expressway Terminal District, opened in 1964, is on a 137-acre site.[20] The Terminal City Truck District, opened in May, 1965, is on a 424-acre site.[21] A study which proposed a truck terminal district on the Ohio Turnpike recommended a minimum site of one square mile.[22] A 650-acre site in Atlanta, Georgia, is presently being planned for a truck terminal district.[23]

Total land requirements for truck terminal districts in the community may be met by several methods. The amount of land needed may be planned as one large development or several smaller areas. In large metropolitan areas the planner may consider several areas for terminal development. The Chicago Committee on Motor Truck Terminals recommended in its *Report and Recommendations, 1950* four areas of approximately 90 acres for the Chicago area.

Topography and Soils

The site for a planned truck terminal district should be relatively level with no abrupt changes in topography. Steep grades in the district seriously affect the maneuverability of the large trucks. However the site should have sufficient slope to drain properly and thus be accessible for truck circulation at all times.

Test borings of the soil should be made in order to determine its load-bearing strength. The quality of the soil should be adequate to support the foundations for the structures. Also, the quality of soil will be important in determining the type of surfacing needed for the streets, apron areas and truck parking.

Utilities

Adequate storm drainage is very important in order to handle the run-off from the large amount of hard-surfaced area that will be in the district. The availability of water, sewer and electricity is necessary for a truck terminal district; however, the operation will not create a major burden on these utilities. If the utilities are adequate for commercial and light industrial development, there will be no problem with the truck terminal district.

Buffer Strips

While it is desirable to locate the terminal district in an industrial area, there may be times when the district abuts residential property. Nuisance factors such as noise, lights and fumes would be objectionable to adjoining residential land uses. When it is necessary to locate adjacent to residential or similar unrelated land uses, a buffer strip with adequate screening from the objectionable factors

should be provided.

CHAPTER IV

METHODS OF IMPLEMENTING PLANS FOR TRUCK TERMINAL DISTRICTS

There are three principal tools for implementing plans for truck terminal districts: the future land use plan; the zoning ordinance; and the planned truck terminal district. This chapter will present a study of these tools and recommend appropriate implementing procedures.

Future Land Use Plan

The designation of areas for truck terminals on the future land use plan is one method of encouraging the proper location of truck terminal districts. By showing areas that meet locational and site requirements, both the community and the trucking industry will be assured of properly located truck terminals.

One example of this method of implementation is found in Atlanta, Georgia. In the planning study, *Now . . . For Tomorrow*, three terminal districts were indicated on the future land use plan. These districts, located in the northwest, east and southeast sections of Metropolitan Atlanta, were designated because they were "adjacent to the intermediate major street loop, and well located to serve the present and future pattern of industrial development."[24] As a result, most of the new terminals have been located in these areas.

Zoning

Zoning is probably the most important legal device available for carrying out a future land use plan.

An extensive review of existing zoning ordinances was made as a basic part of the research for this thesis. In this survey an attempt was made to determine: (1) the most restricted districts in which truck terminals were permitted; (2) what measures of control were being exercised through zoning ordinances; and (3) the extent to which special truck terminal districts are designated in zoning ordinances.

Basis for Selecting Zoning Ordinances

Five hundred fifty-nine municipal zoning ordinances and 20 county zoning ordinances were reviewed. Ordinances from all 50 states were included. The number from each state was roughly proportioned to the total number of cities in the state with zoning ordinances. The 25 largest cities in the United States having a zoning ordinance were included in the survey. There were no significant differences between city and county zoning ordinances in terminal locations or restrictions. Neither did the size of city have any bearing on these factors. Appendices A, B and C present tables indicating the number of city and county ordinances reviewed in each state and also the population of the cities whose zoning ordinances were reviewed.

Results of Zoning Ordinance Survey

Table 3 shows the zoning districts in which truck terminals were permitted and whether they were permitted as a matter of right without restrictions, as a matter of right with restrictions or as special exceptions. The majority (325) of the zoning ordinances permitted truck

terminals in industrial districts. Truck terminals were permitted in commercial districts in 141 zoning ordinances. Only one ordinance had a special district for truck terminals. In 101 ordinances truck terminals were not mentioned.

Truck terminals were not permitted in 11 of the ordinances surveyed. However, these ordinances were for satellite cities around large metropolitan areas and no manufacturing or industrial uses were permitted. Only residences and limited commercial activities were permitted in these ordinances.

Truck Terminals Permitted as a Matter of Right. In 421 of the zoning ordinances surveyed, truck terminals were permitted as a matter of right. In 408 of these ordinances, they were permitted without special restrictions. However, 13 ordinances imposed restrictions upon truck terminals in addition to the regular requirements for the district.

The additional restrictions in some of these ordinances are valid protection for both surrounding land uses and the trucking industry. In the Azusa, California, ordinance (adopted in 1958), truck terminals are permitted in the M-1 zone provided they are:

> Located not less than fifty (50) feet from any land classified in any R-1a, R-1b, R-1c, R-3, P, C-2, or C-3 Zone, and not less than fifty (50) feet from any M-1 boundary located across a street or alley from any land in the above classification.[25]

The Arlington County, Virginia, ordinance (adopted in 1958), permits truck terminals in the Limited Industrial Districts, provided they are "conducted wholly within a completely enclosed building or within an area enclosed on all sides with a solid wall or uniformly painted board fence not less than six (6) feet in height."[26] The Trenton, Michigan,

Table 3. Zoning Districts in Which Truck Terminals Are Permitted

Most Restricted District	MATTER OF RIGHT: No Restrictions	MATTER OF RIGHT: With Restrictions	Special Exception	Not Permitted	Not Mentioned
COMMERCIAL					
Central Business District	2	0	2		
General Commercial	124	3	7		
Highway Commercial	2	1	0		
Sub Total	128	4	9		
INDUSTRIAL					
Light Industrial	199	7	26		
Medium Industrial	62	2	8		
Heavy Industrial	16	0	3		
Planned Districts	2	0	0		
Sub Total	279	9	37		
SPECIAL TERMINAL DISTRICT	1	0	0		
TOTAL	408	13	36	11	101

ordinance (undated), permits truck terminals in the M-1 Industrial District "when direct access is available to County or State highways."[27]

Several ordinances had performance standards to control the undesirable characteristics of truck terminals and other uses. The Orlando, Florida, ordinance (adopted in 1961), permits truck terminals in the Wholesale Commercial District provided the operation is within the established standards for controlling noise, vibration, glare and other nuisance characteristics.[28] The performance standards in this ordinance will make it difficult to operate a truck terminal. The Monroe, Connecticut, ordinance (adopted in 1959), has performance standards similar to the Orlando, Florida, ordinance and, in addition, includes the following restrictions:

> Storage: Except for the off-street parking of vehicles of customers and employees, the outside storage of goods, equipment and vehicles shall not exceed in ground area coverage more than 50% of the coverage of the building or buildings and shall be suitably screened from view from the public highway or adjoining property by appropriate fencing, grading or landscaping.[29]

The outside storage restriction of this ordinance, not permitting ground area coverage of more than 50 per cent of the buildings' area, would prohibit adequate outdoor storage of the large intercity trucks.

The zoning ordinance for the City of Chicago was the only ordinance surveyed which included a special district for truck terminals. The Committee on Motor Truck Terminals, in its report in 1950, recommended that a new zoning classification--known as Truck Terminal Districts--be passed. This recommendation was enacted in the 1955 Zoning Ordinance and with some refinement enacted in the 1965 Zoning Ordinance. Pertinent sections from the 1965 Chicago Zoning Ordinance relating to

truck terminals in the C-4-Motor Freight Terminal District are presented in Appendix D of this study.

Truck Terminals Permitted as a Special Exception. The special exception usually permits a specified land use to be located within a district only upon approval of an administrative authority, usually after a public hearing. The authority for approval is usually the Board of Zoning Appeals. In 46 of the zoning ordinances surveyed, truck terminals were permitted as a special exception. Approval was granted by the Board of Zoning Appeals in 50 per cent of the ordinances, by the planning commission in 33 per cent and by the local governing body in 17 per cent of the ordinances.

In permitting a special exception, the administrative authority usually has considerable discretion in granting or refusing approval. For example, the Mount Sterling, Kentucky, ordinance (adopted in 1960), permits truck terminals, along with several other uses, in heavy industrial districts as a special exception if approved by the Board of Zoning Adjustment. This approval is "granted if it is determined that the proposed use will not extend its detrimental or obnoxious effects beyond the limits of the heavy industrial districts in which it is located."[30]

Most ordinances, however, are more explicit in stating the conditions under which a special permit may be issued. An example of the more detailed requirements is found in the zoning regulations for Mansfield, Connecticut, adopted in 1960. This ordinance permits truck freight terminals in the Manufacturing District by special permit under the following conditions:

Before granting a Special Permit, the Planning and Zoning Commission shall make special findings (as well as any additional special findings set forth for any specific use) that the proposed use as described and reprsented by the applicant:

1. will be appropriately located with respect to transportation, water supply, waste disposal, fire and public protection, and other public facilities.

2. will not cause undue traffic congestion or create a traffic hazard. . . .

3. will not adversely affect the character of, or property values in, the area.

4. will not otherwise impair public health, safety, morals, convenience, comfort, prosperity, and other aspects of the general welfare of the Town.

5. will comply with all other Regulations applicable to such use.

The Commission may, at its discretion, hold a public hearing prior to the special findings which are necessary for the issuance of a special permit. . . .[31]

Zoning Recommendations

In large metropolitan areas, especially major distribution centers, it would be advisable to establish special districts for truck terminals and related land uses. It is important that these zoned districts be large enough to meet the future needs of the community and prevent a monopoly of terminal sites.

Most communities can properly regulate the location and operation of truck terminals by permitting truck terminals as a matter of right in a manufacturing or light industrial district. However, there are special requirements which truck terminals should meet. These special requirements include the following:

1. Major Highway Access. Truck terminals must have adequate

access to major highways.

2. Parking Space. Two truck parking spaces and one employee parking space should be required for each loading berth.
3. Buffer Strip. When the terminal site abuts a residential district, a buffer strip with planting and a solid wall or fence at least six feet high should be provided.
4. Terminal Ingress and Egress. Ingress and egress into the terminal should be approved by the traffic engineer.

Planned Terminal Districts

Planned terminal districts may be organized and operated in the same manner as planned industrial districts, since many of their characteristics are similar. The planned terminal district should be subdivided and developed according to a comprehensive plan with streets and utilities installed before sites are sold for development. Protective covenants may be required for adequate control of the area and buildings. The covenants should allow sufficient flexibility to meet future changing conditions.

The location and operation of the district should offer definite economic advantages to the trucking industry. This may be accomplished through: (1) desirable site lease or purchase agreements; (2) assurance of adequate space for expansion; (3) assurance of compatible neighbors; (4) efficient freight interchange; (5) convenient access to existing and future customers; (6) proximity to related land uses; (7) protection from

unrelated land uses; and (8) effective administrative controls.

Two of the terminal district studies, discussed earlier in this thesis, propose varying methods of implementation. The study for a consolidated truck terminal district near the Ohio Turnpike recommends that the local community retain the power to enforce the provisions relating to the administration of the terminal area. This study suggests a committee made up of truckers, community officials, civic leaders, local and regional planners be established to form a master plan for the area, giving consideration to the following points.

> Comprehensive study of trucking in Greater Cleveland to determine how the terminal project can best satisfy local needs.
>
> Selection of a suitable site.
>
> Design of area and facilities to best fit trucking needs and conform to the community pattern.
>
> Financial plan to get project started and help it pay its way.
>
> Controls for traffic and noise as well as policing program.
>
> Long-range expansion provisions.
>
> Provision for continuing coordination of terminal operations with the Turnpike Commission and community as well as highway and park officials.
>
> Provision for periodic review.
>
> After laying plans, winning approval and support, and moving through building and operational stages, a terminal planning committee would continue to serve in a governing capacity. It would make certain that terminal development and administration follow the master outline. . . .[32]

The South Expressway Terminal District is now being developed in the Chicago area by private developers. These developers will provide for the trucking companies to buy property and buildings or the trucker may

obtain a lease or sale-and-lease-back of the property and buildings.[33]

Planned terminal districts provide an efficient method for locating truck terminals. However, the terminal needs of the trucking industry must be studied to determine the feasibility of planned districts. These planned districts will only be practical for large metropolitan areas and other communities serving as transportation hubs for freight movement.

Conclusion

The truck terminal district, located in relation to the community's future plan for development, is the most practical solution for locating truck terminals. The district will most effectively serve the needs of the trucking industry and result in a minimum of land use and traffic problems created by the trucking operation. Designated terminal districts, indicated on the future land use plan, will assure both the community and the trucking industry of properly located truck terminals. In addition, large metropolitan areas, especially major distribution centers, may have planned terminal districts developed in the same manner as planned industrial districts. Most communities can effectively control the trucking operation by permitting truck terminals and related facilities in a manufacturing or industrial district of the zoning ordinance with special requirements pertinent to the trucking operation.

APPENDICES

APPENDIX A

Number of Municipal Zoning Ordinances Reviewed by State

State	Number of Ordinances	State	Number of Ordinances
Alabama	35	Montana	2
Alaska	5	Nebraska	3
Arizona	9	Nevada	1
Arkansas	5	New Hampshire	4
California	58	New Jersey	27
Colorado	8	New Mexico	3
Connecticut	17	New York	25
Delaware	1	North Carolina	18
District of Columbia	1	North Dakota	3
Florida	12	Ohio	14
Georgia	17	Oklahoma	7
Hawaii	1	Oregon	6
Idaho	3	Pennsylvania	20
Illinois	36	Rhode Island	6
Indiana	8	South Carolina	5
Iowa	8	South Dakota	2
Kansas	7	Tennessee	19
Kentucky	17	Texas	22
Louisiana	3	Utah	3
Maine	3	Vermont	3
Maryland	3	Virginia	11
Massachusetts	21	Washington	8
Michigan	28	West Virginia	3
Minnesota	10	Wisconsin	11
Mississippi	8	Wyoming	2
Missouri	6		
		U. S. TOTAL	559

APPENDIX B

Number of County Zoning Ordinances Reviewed by State

State	Number of Ordinances
California	3
Connecticut	2
Georgia	1
Hawaii	2
Illinois	2
Indiana	2
Maryland	2
North Carolina	2
Oregon	1
Pennsylvania	1
Tennessee	1
Virginia	1
TOTAL	20

APPENDIX C

Population of Cities Whose Zoning Ordinances were Reviewed

Population	Number of Ordinances
Over 1,000,000	5
500,000-1,000,000	11
250,000-499,999	22
100,000-249,000	45
50,000-99,999	77
25,000-49,999	92
10,000-24,999	110
Under 10,000	197
TOTAL	559

APPENDIX D

Chicago Zoning Ordinance
Truck Terminal Districts

PREAMBLE--C4 Motor Freight Terminal District

The C4 Motor Freight Terminal District is designed to accommodate large-scale trucking terminal operations involving inter-state and intra-state motor carriers, which activities are incompatible with the great majority of other land uses and so are most suitably placed in a special zoning district mapped in strategic locations for efficient coordination with the city's planned street and thoroughfare system.

9.3-4 Permitted Uses--C4 Motor Freight Terminal District.

A. Uses permitted in the C4 District are subject to the following conditions:

(1) All businesses, servicing, or processing--except for off-street parking or loading--shall be conducted within completely enclosed buildings unless otherwise indicated hereinafter, and except for establishments of the "drive-in" type offering goods or services directly to customers waiting in parked motor vehicles.

(2) All activities involving the production, processing, cleaning, servicing, testing, or repair of materials, goods, or products shall conform with the performance standards established for the M2-1 to M2-5 Manufacturing Districts in Article 10 or this comprehensive amendment.

B. The following uses are permitted in the C4 District:

(1) Automobile Service Stations--for the retail sale and dispensing of fuel, lubricants, tires, batteries, accessories and supplies including installation and minor services customarily incidental thereto. Facilities for chassis and gear lubrication and for washing of not more than two vehicles, are permitted only if enclosed in a building.

(2) Bank.

(3) Barber Shops, Beauty Parlors, Massage or Similar Personal Service Shops.

(4) Battery and Tire Service Stations.

(5) Cartage and Express Facilities.

(6) Currency Exchange.

(7) Drug Stores.

(8) Fuels, Solid--storage and wholesale distribution of.

(9) Garages and Parking Lots, auto and truck.

(10) Hotels or Lodging Houses.

(11) Lodges and Offices of Labor Organizations.

(12) Motor Freight Terminals, Railroad and Water Freight Terminals, Warehouses, Railroad Switching and Classification Yards, Repair Shops, and Round Houses.
(13) Motor Vehicle Service Shops, for passenger and commercial vehicles, including body repair, automobile painting and engine rebuilding.
(14) Packing and Crating.
(15) Parcel Delivery Stations.
(16) Petroleum, Flammable Liquids, Fats or Oils--Wholesale distribution of, or storage of, in tanks of 15,000 gallons or less capacity.
(17) Recreation Centers.
(18) Restaurants.
(19) Signs, as regulated by Section 9.9.
(20) Taverns.
(21) Temporary Buildings for Construction Purposes, for a period not to exceed the duration of such construction.
(22) Tobacco Shops.
(23) Dwelling Units, for watchmen and their families located on the premises where they are employed in such capacity.
(24) Accessory Uses.

9.4 Special Uses--Use and Bulk Regulations.
The following uses may be allowed as special uses by the Board of Appeals in the districts indicated hereinafter. . . .

9.4-4 Special Uses--C4 Motor Freight Terminal District.
(1) Heliports.
(2) Public Utility and Public Service Uses, including:
a. bus terminals, bus turn-arounds (off-street), bus garages, bus lots, street railway terminals, or street car houses
b. electric sub-stations
c. fire stations
d. police stations
e. railroad passenger stations
f. railroad rights-of-way
g. telephone exchanges, micro wave relay towers, and telephone transmission equipment buildings
h. water filtration plants
i. water pumping stations
j. water reservoirs
(3) Repealed 7-28-61, Coun. J. p. 5335
(4) Parks and Playgrounds.
(5) Radio and Television Towers.
(6) Roof signs in excess of 50 feet in height from curb level.

9.5-4 Maximum Floor Area Ratio--C4 Motor Freight Terminal District.
In a C4 District, the floor area ratio shall not exceed 1.2.

9.8-4 Transitional Yards--C4 Motor Freight Terminal District.
In a C4 District, no building, structure, or other obstructions, (except as allowed in Section 5.7-5, Permitted Obstructions in Required Yards) nor any off-street loading or unloading operation shall be

located within 100 feet of the boundary of any Residence District nor within 50 feet of the boundary of any Business, Commercial or M1 District, unless such building, structure, or other obstruction is devoted to a permitted use other than Motor Freight Terminal, Railroad Freight Terminal or Water Freight Terminal, in which case the transitional yard regulations for the B1-1 to B1-5 shall apply to such uses.

9.9-4 Permitted Signs--C4 Motor Freight Terminal District.

In the C4 District, business and advertising signs are permitted without restriction except that roof signs shall not project higher than 50 feet from the curb level, except as provided in Section 9.4-4 and except as provided near public parks, major routes and Residence Districts in Section 9.9.

9.10-4 Off-Street Loading--C4 Motor Freight Terminal District.

(1) Banks. For buildings containing 10,000 to 100,000 square feet of floor area, one loading berth shall be provided; for each additional 100,000 square feet of floor area to 500,000 square feet, one additional loading berth shall be provided, plus one additional loading berth for each additional 500,000 square feet of floor area or fraction thereof in excess of 500,000 square feet.

(2) Retail Stores, Restaurants. The loading requirements for Retail Stores and Restaurants in the C1 Districts shall apply to the C4 District.

(3) Warehousing and Storage. For buildings containing 5,000 to 40,000 square feet of floor area, one loading berth shall be provided. For buildings containing 40,000 to 100,000 square feet of floor area, two loading berths shall be provided, plus one additional loading berth for each additional 100,000 square feet of floor area or fraction thereof. Each such loading berth for buildings in excess of 10,000 square feet of floor area shall be not less than 10 feet in width by 50 feet in length.

9.11-1 Off-Street Parking--C1-1, C1-2, C2-1, C2-2, C3-1, C3-2 and C4 Districts.

All parking spaces required to serve buildings or uses shall be located on the same zoning lot as the building or use served, except as provided for as a Special Use; in which case, buildings or uses may be served by parking facilities located on land other than the zoning lot on which the building or use served is located, provided such facilities are within 500 feet walking distance to the use served . . . Parking spaces required on an employee basis shall be based on the maximum number of employees on duty or residing, or both, on the premises at one time. For the following uses, when allowed in any of the above districts, parking facilities shall be provided as indicated. . . .

(1) Any Production, Processing, Cleaning, Servicing, Testing, or Repair of Materials, Goods or Products; for Warehouses and Storage Buildings. One parking space shall be provided for each four employees.

(2) Automobile Service Stations. One parking space shall be provided for each three employees.

(3) Banks, Business or Professional Offices, and Public Administration Buildings. One parking space shall be provided for each 500 square feet of floor area in excess of 4,000 square feet. . . .

(9) Establishments Handling the Sale and Consumption on the Premises of Alcoholic Beverages, Food, or Refreshment. One parking space shall be provided for each 400 square feet of floor area in excess of 4,000 square feet. . . .

(11) Furniture and Appliance Stores, Motor Vehicle Sales, Wholesale Stores, Household Equipment or Furniture Repair Shops, or Machinery Sales. One parking space shall be provided for each 600 square feet of floor area in excess of 4,000 square feet. . . .

(17) Motels and Tourist Homes. One parking space shall be provided for each dwelling unit or lodging room.

(18) Motor Freight Terminals and Local Cartage Companies. One parking space shall be provided for each four employees, plus one parking space for each vehicle used in the conduct of the enterprise.

(19) Municipal or Privately-Owned Recreation Buildings or Community Centers. One parking space shall be provided for each three employees, plus spaces adequate in number--as determined by the Department of City Planning--to serve the public. . . .

(23) Retail Stores. One parking space shall be provided for each 400 square feet of floor area in excess of 4,000 square feet. . . .

(30) Other Uses Allowed in These Districts. Parking spaces shall be provided on the same basis as required for the most similar listed use--as determined by the Department of City Planning.

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